A Proposed Vision Information Architecture

John M. George

Chief Engineer

Department of the Navy Information Network Project Office

Agenda

- The Need
- The Architecture
- The Subscriber Model
- The Architecture in Action
- Success Factors

John George —— john.george@inpo.navy.mil

The Need
(Good News)

- Explosion of Information Technology (IT) has nurtured the development of very capable systems
- Desktop computing resources have taken systems development out of the “glass-house” and down to the end-user
- “Communities of interest” are getting their specific problems solved
- “Standards” are finally being recognized as a best-practice

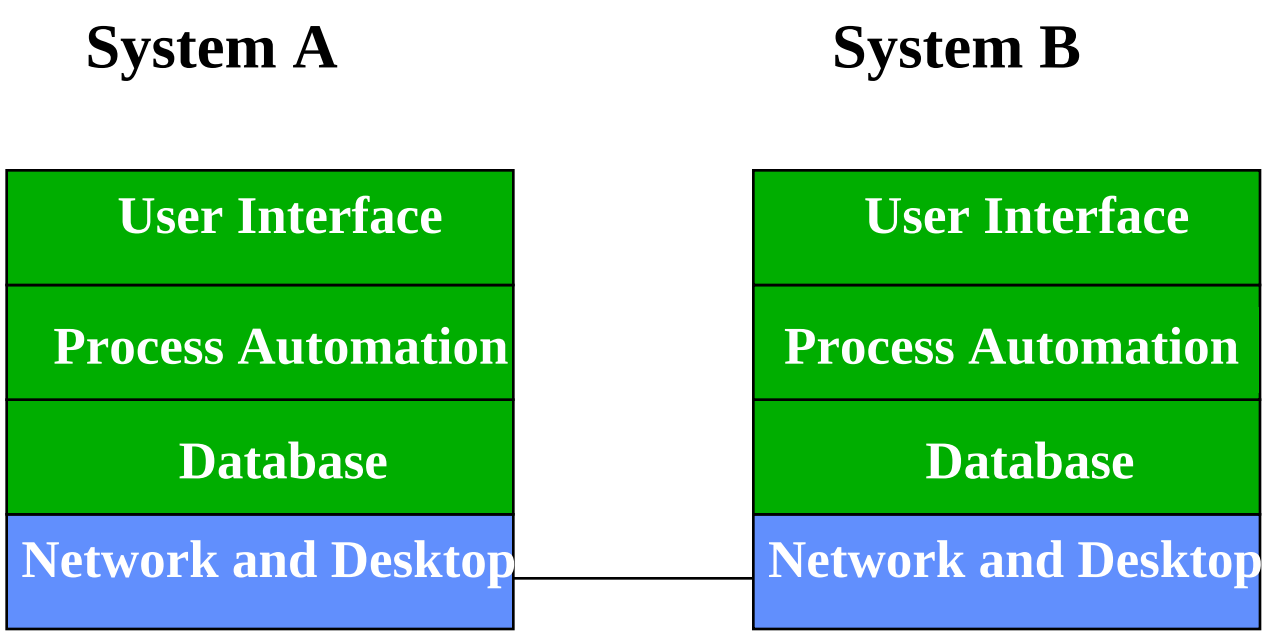
John George —— john.george@inpo.navy.mil

The Need
(Bad News)

- There are hundreds of “capable systems” which don’t interoperate
- Many systems are developed in isolation (i.e.. “Stovepipes”)
- Use of “Standards” does not guarantee interoperability

John George —— john.george@inpo.navy.mil

The Need
(Typical Systems Architecture)



John George —— john.george@inpo.navy.mil

The Need
(In Summary)

- Applications/systems are built as self-contained “stove pipes”
- There is little or no interaction between applications/systems. At most, they share a common desktop platform, and a LAN.
- Little use is made of COTS, instead we frequently rely on “coding from scratch”.
- The lack of commonality and systems approach has yielded applications that do not scale well across the enterprise.
- Our applications cannot share needed data and do not yield consistent information.

John George —— john.george@inpo.navy.mil

The Architecture
(Goals)

- Factor-out common elements from stove-pipe applications
- Generalize the factored elements and describe using industry-standard terminology
- Redefine infrastructure to include the industry standard elements
- Provide appropriate interfaces at each level to service applications and subscribers
- Preserve a community's ability to solve its unique problems

John George —— john.george@inpo.navy.mil

The Architecture
(Infrastructure Model)

Application Enablers (Document Management, Workflow, EMAIL)
Application Support(Object Management, Messaging, APIs, etc.)
Data Architecture
Network & Desktop (Wires, Protocols, etc..)

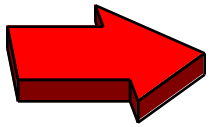
John George —— john.george@inpo.navy.mil

The Architecture
(Features)

- TAFIM Compliant
- Standard selection process will ensure interoperability
- Infrastructure-based

John George —— john.george@inpo.navy.mil

The Infrastructure
(Network and Desktop Details)



Application Enablers (Document Management, Workflow, EMAIL)

Application Support(Object Management, Messaging, APIs, etc.)

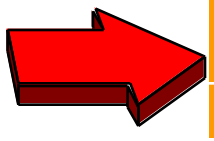
Data Architecture

Network & Desktop (Wires, Protocols, etc.)

- **Standardize on TCP/IP**
- **Stress interface commonality and not OS and hardware commonality**
- **Allowing the market to limit the OS and hardware standards will achieve economies of scale**

John George —— john.george@inpo.navy.mil

The Infrastructure
(Data Architecture Details I)



Application Enablers (Document Management, Workflow, EMAIL)

Application Support(Object Management, Messaging, APIs, etc.)

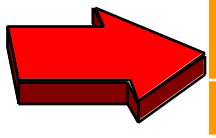
Data Architecture

Network & Desktop (Wires, Protocols, etc.)

- Common repository for all “Corporate” data
- Common Object oriented data definitions
- Links to legacy systems with mappings into common data definitions
- Distributed in nature
- Security attributes part of each data object

John George —— john.george@inpo.navy.mil

The Infrastructure
(Data Architecture Details II)



Application Enablers (Document Management, Workflow, EMAIL)

Application Support(Object Management, Messaging, APIs, etc.)

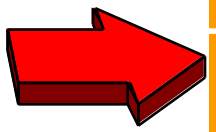
Data Architecture

Network & Desktop (Wires, Protocols, etc.)

Ideal application for data warehousing provided transactional processing is supported

John George —— john.george@inpo.navy.mil

The Architecture
(Application Support Details I)



Application Enablers (Document Management, Workflow, EMAIL)

Application Support(Object Management, Messaging, APIs, etc.)

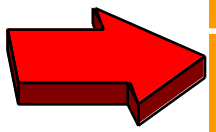
Data Architecture

Network & Desktop (Wires, Protocols, etc.)

- Contains key data locating, passing and accessing mechanisms including
  - Directory Services
  - Messaging
  - Object Management

John George —— john.george@inpo.navy.mil

The Architecture
(Application Support Details II)



Application Enablers (Document Management, Workflow, EMAIL)

Application Support(Object Management, Messaging, APIs, etc.)

Data Architecture

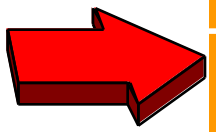
Network & Desktop (Wires, Protocols, etc.)

Directory Services

– Object-oriented naming service which can be used to map “friendly” names for objects to machine names (e.g.. X.500 services used by DMS to map names to messaging addresses)

John George —— john.george@inpo.navy.mil

The Architecture
(Application Support Details III)



Application Enablers (Document Management, Workflow, EMAIL)

Application Support(Object Management, Messaging, APIs, etc.)

Data Architecture

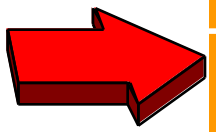
Network & Desktop (Wires, Protocols, etc.)

Messaging

- Standard method to pass objects between network nodes
- DMS/X.400 would be a likely candidate to fill this function

John George —— john.george@inpo.navy.mil

The Architecture
(Application Support Details IV)



Application Enablers (Document Management, Workflow, EMAIL)

Application Support(Object Management, Messaging, APIs, etc.)

Data Architecture

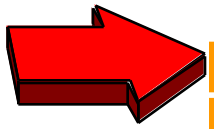
Network & Desktop (Wires, Protocols, etc.)

Object Management

- Brokering technology which will allow information in the Data Architecture to be described and/or encapsulated in an object-oriented environment
- Applications can access information by requesting it through the object broker

John George —— john.george@inpo.navy.mil

The Architecture
(Application Enablers Details I)



Application Enablers (Document Management, Workflow, EMAIL)

Application Support(Object Management, Messaging, APIs, etc.)

Data Architecture

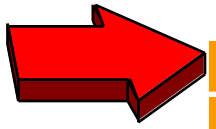
Network & Desktop (Wires, Protocols, etc.)

"Applettes" which provide a user interface and simple APIs to the underlying Application Support layer

- **Electronic Mail**
- **Work-flow**
- **Document Management**
- **Others...**

John George —— john.george@inpo.navy.mil

The Architecture
(Application Enablers Details II)



Application Enablers (Document Management, Workflow, EMAIL)

Application Support(Object Management, Messaging, APIs, etc.)

Data Architecture

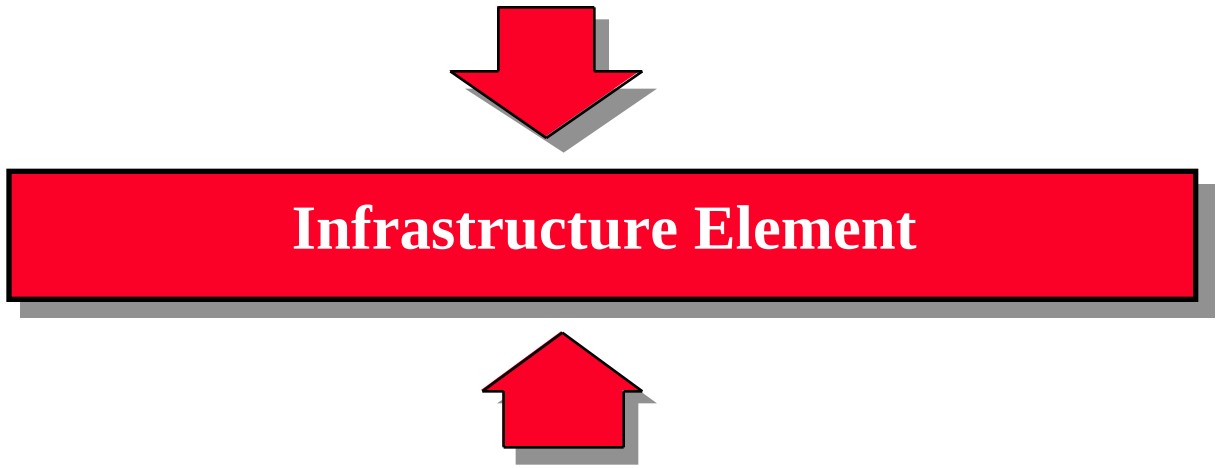
Network & Desktop (Wires, Protocols, etc.)

- Electronic mail relies on Directory and messaging services for personal messages
- Work-flow relies on Messaging, Directory Services, and Object Management to implement automated processes
- Document management relies on Directory and Object Management services for document storage, indexing, and retrieval

John George —— john.george@inpo.navy.mil

The Subscriber Model

The Architecture provides services to which applications can subscribe



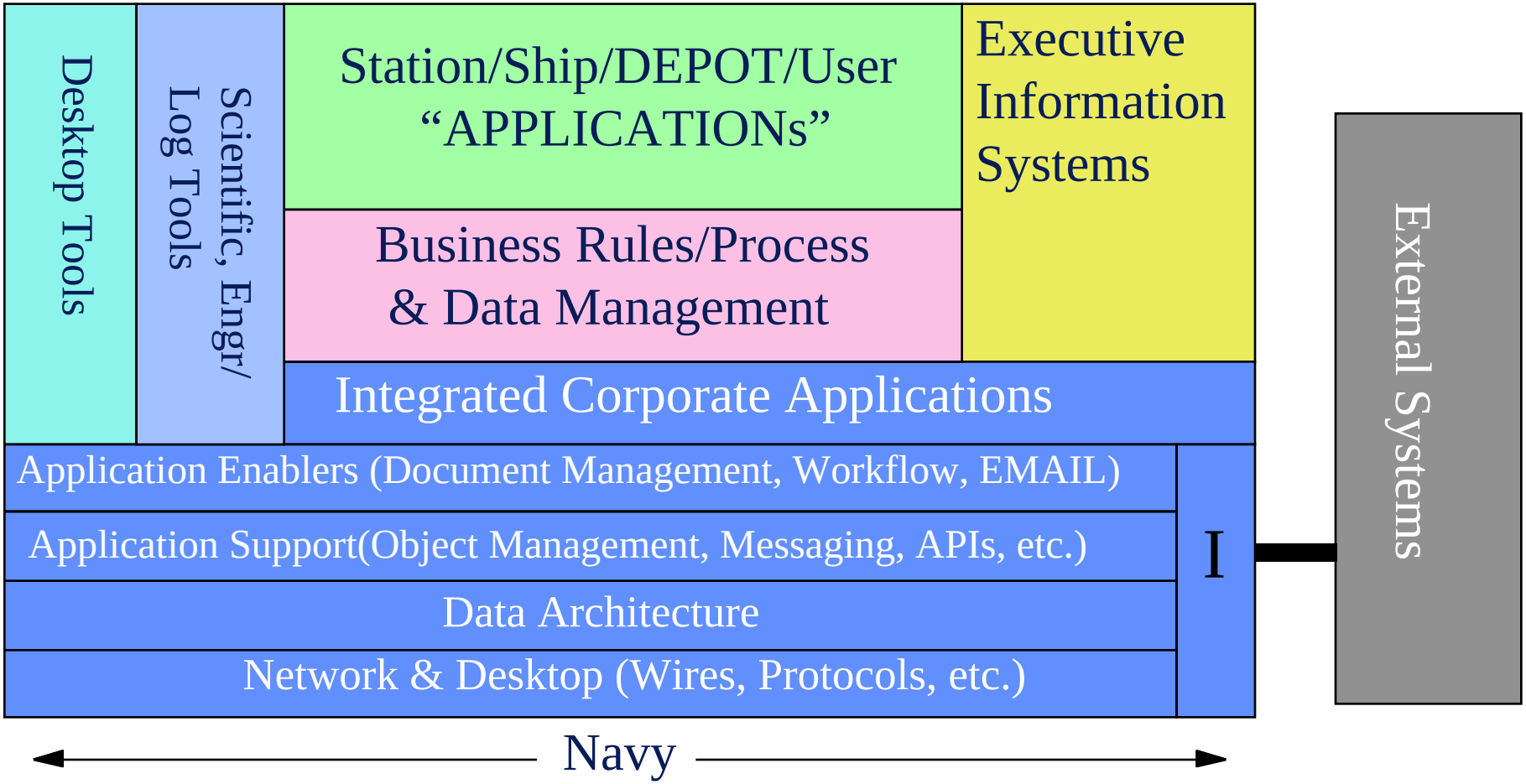
John George —— john.george@inpo.navy.mil

The Subscriber Model

- COTS, “Corporate”, Community of Interest specific applications, and Executive Information Systems (EIS) can use the same subscription model to access the services of the architecture
- Applications focus on the User Interface while letting the infrastructure handle the details of information access and flow
- Applications and Systems reduce to “stubs” riding on the Architecture

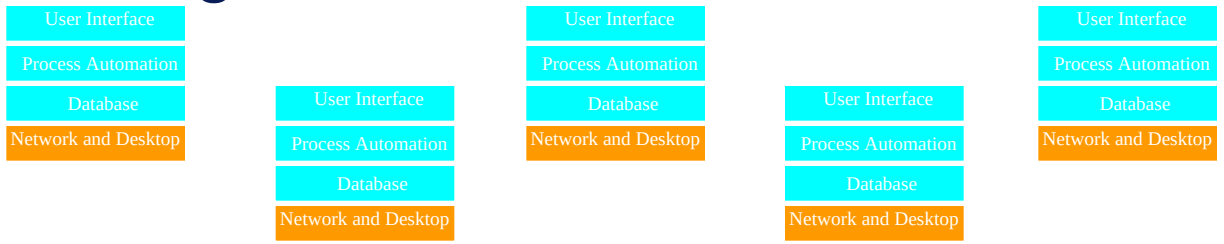
John George —— john.george@inpo.navy.mil

Vision Architecture



The Architecture in Action I

- A current application implemented using today's paradigm



- The same application if developed using the proposed Architecture

John George —— john.george@inpo.navy.mil

The Architecture in Action (II)

Health of Naval Aviation (HONA) -- An EIS which forecasts life-cycle costs for Naval Aircraft by merging:

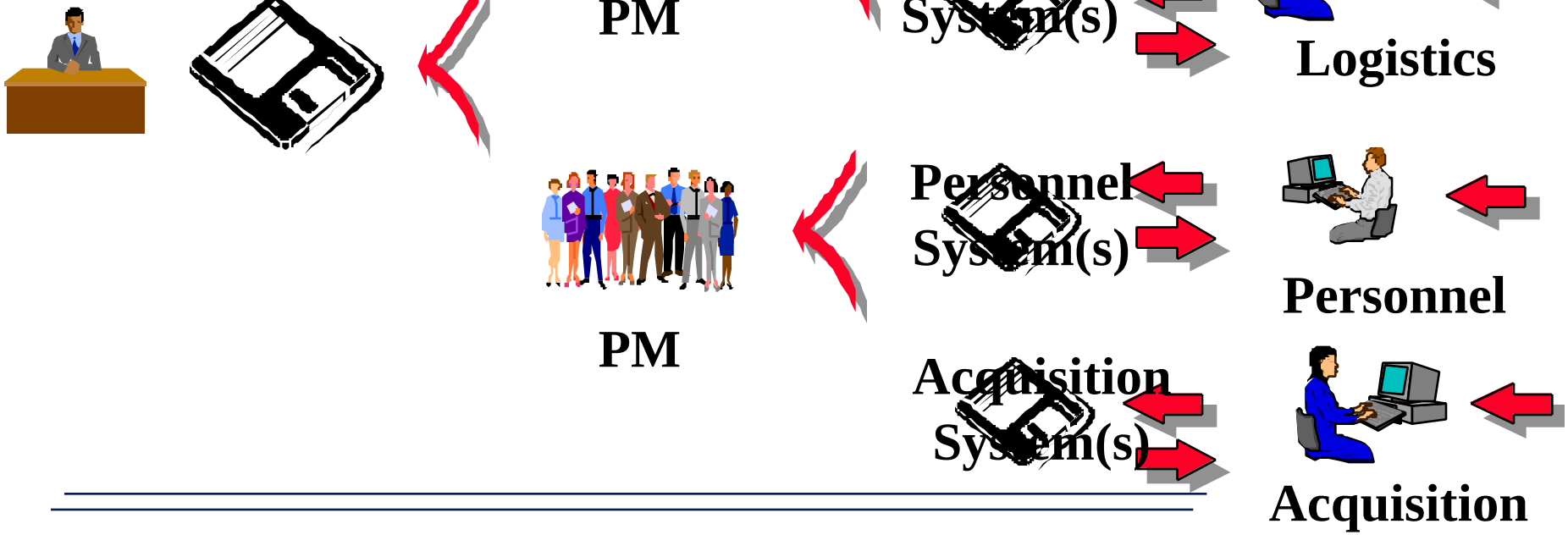
- Financial Data
- Personnel Data
- Acquisition Data
- Logistics Data

John George —— john.george@inpo.navy.mil

The Architecture in Action (III)

- On a monthly basis:
  - Program Managers *manually* enter Financial, Personnel, Acquisition, and Logistics data
  - Reports are generated
  - Executives review reports
- The application satisfies the customer need, but fundamental challenges exist:
  - Data isn't always kept up to date
  - Manual entry is error prone and "filterable"
  - Information is at least one month late
  - Views of the information are static

HONA Today



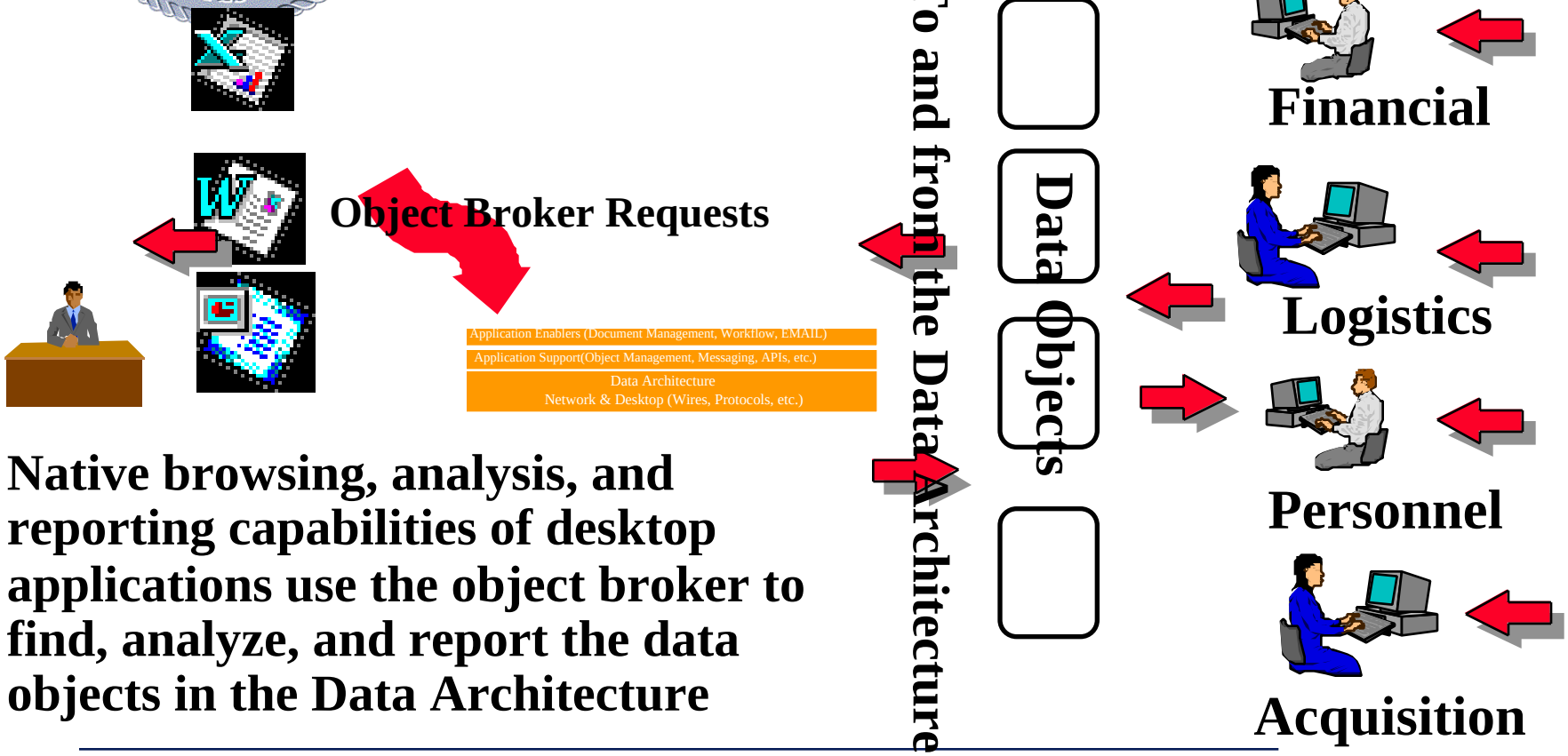
John George —— john.george@inpo.navy.mil

The Architecture in Action (IV)

- Changes to the EIS could be made
  - Manual entry could be replaced with automatic and continuous information sourcing
  - Familiar desktop tools (spreadsheets, presentation packages, and word processors) could be used to view, analyze, and report data
  - Canned or adhoc analysis can be done at any time with the *latest* information

John George —— john.george@inpo.navy.mil

HONA Under the Vision Architecture



Native browsing, analysis, and reporting capabilities of desktop applications use the object broker to find, analyze, and report the data objects in the Data Architecture

John George —— john.george@inpo.navy.mil

Success Factors

- Disciplined approach to the design or procuring of systems which will interface with the Architecture
- The Architecture must be flexible, but have a strong configuration management process
- User must be empowered through training and have access to a suite of COTS tools
- International and Industry standards must be employed -- Let the market decide
- Commitment from the highest levels of the organization